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Without international search report and to be republished upon receipt of that report.

(54) Title: DISEASE RESISTANCE FACTORS

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SEQ ID NO:18  ------------------------------------------------------------
SEQ ID NO:22  TKTSAPFLFTLSLRSNMTEERNVRKTRV-------VDVVLDCVIPYIDDPKDRDAVSQVC
SEQ ID NO:20  MGGEAP------------EARRLDRAMSFGGAGSIPEEALHLVLGYVDDPRDREAVSLVC
SEQ ID NO:37  M-----------------EDPDIKRCKL--SCVATVDDVIEQVMTYITDPKDRDSASLVC
                1                                                       60

SEQ ID NO:18  ----------------------------------------TRPRT---------------
SEQ ID NO:22  RRWYELDSLTRKHVTIALCYTTTPARLRRRFPHLESLKLKGKPRAAMFNLIPEDWGGHVT
SEQ ID NO:20  RRWHRIDALTRKHVTVPFCYAASPAHLLARFPRLESLAVKGKPRAAMYGLIPEDWGAYAR
SEQ ID NO:37  RRWFKIDSETREHVTMALCYTATPDRLSRRFPNLRSLKLKGKPRAAMFNLIPENWGGYVT
              61                                                       120

SEQ ID NO:18  ------------------------------------------------------------
SEQ ID NO:22  PWVKEISQYFDCLKSLHFRRMIVKDSDLQNLARDRGHVLHALKLDKCSGFTTDGLFHIGR
SEQ ID NO:20  PWVAELAAPLECLKALHLRRMVVTDDDLAALVRARGHMLQELKLDKCSGFSTDALRLVAR
SEQ ID NO:37  PWVTEISNNLRQLKSVHFRRMIVSDLDLDRLAKARADDLETLKLDKCSGFTTDGLLSIVT
             121                                                       180

                      *  **          *   **  *  ** ***  *          **     *
SEQ ID NO:18  --RGLETLFLEESTIDEKENDEWIRELATSNSVLETLNFFLTDL-RASPEYLTLLVRNCQ
SEQ ID NO:22  FCKSLRVLFLEESSILEKD-GEWLHELALNNTVLETLNFYLTDIAVVKIEDLELLAKNCP
SEQ ID NO:20  SCRSLRTLFLEECSIADNGT-EWLHDLAVNNPVLETLNFHMTEL-TVVPADLELLAKKCK
SEQ ID NO:37  HCRKIKTLLMEESSFSEKD-GKWLHELAQHNTSLEVLNFYMTEFAKISPKDLETIARNCR
             181                                                       240
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(57) Abstract

This invention relates to an isolated nucleic acid fragment encoding a disease resistance factor. The invention also relates to the construction of a chimeric gene encoding all or a substantial portion of the disease resistance factor, in sense or antisense orientation, wherein expression of the chimeric gene results in production of altered levels of the disease resistance factor in a transformed host cell.

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INTERNATIONAL SEARCH REPORT

Int[illegible]tion No
PCT/US 00/11956

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 C12N15/82 C12N15/29 C07K14/415 C12Q1/68

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 C12N C12Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EMBL, BIOSIS, EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DATABASE EMBL [Online] ACCESSION NO:AQ161346, 9 September 1998 (1998-09-09) WING R.A.: "nbxb0006F06f CUGI Rice BAC Library Oryza sativa genomic clone nbxb0006F06f, genomic survey sequence." XP002146944 see sequence ---	1-4,16, 18
P,X	DATABASE EMBL [Online] ACCESSION NO:AW061660, 6 October 1999 (1999-10-06) WALBOT V.: "660012G08.y1 660 - Mixed stages of anther and pollen Zea mays cDNA, mRNA sequence" XP002146880 see sequence --- -/--	1-4,16, 18

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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Date of the actual completion of the international search	Date of mailing of the international search report
12 September 2000	22 12 2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	MADDOX, A

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,X	DATABASE EMBL [Online] ACCESSION NO:AW054624, 26 September 1999 (1999-09-26) WALBOT V.: "660012G08.x1 660 - Mixed stages of anther and pollen Zea mays cDNA, mRNA sequence." XP002146945 see sequence --- DATABASE EMBL [Online] ACCESSION NO:AF036340, 29 May 1998 (1998-05-29) FEYS B.J., ET AL.: "Arabidopsis thaliana LRR-containing F-box protein (COI1) mRNA, complete cds." XP002146881 see sequence -& XIE, D.-X., ET AL.: "COI1: An Arabidsopsis gene required for jasmonate-regulated defense and fertility" SCIENCE, vol. 280, 15 May 1998 (1998-05-15), pages 1091-1094, XP002146875 the whole document -& FEYS, B.J., ET AL.: "ARABIDOPSIS MUTANTS SELECTED FOR RESISTANCE TO THE PHYTOTOXIN CORONATINE ARE MALE STERILE, INSENSITIVE TO METHYL JASMONATE AND RESISTANT TO A BACTERIAL PATHOGEN" THE PLANT CELL, vol. 6, 1994, pages 751-759, XP002049621 the whole document	1-4,16, 18 1-23
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A	--- DATABASE EMBL [Online] ACCESSION NO:AU032235, 19 October 1998 (1998-10-19) SASKAI, T.: "Oryza sativa cDNA, partial sequence (R3783_1A)." XP002146975 see sequence	1-10

-/--

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	BENEDETTI CELSO E ET AL: "Differential expression of a novel gene in response to coronatine, methyl jasmonate, and wounding in the Coi1 mutant of arabidopsis." PLANT PHYSIOLOGY (ROCKVILLE), vol. 116, no. 3, March 1998 (1998-03), pages 1037-1042, XP002146876 ISSN: 0032-0889 the whole document ---	1-23
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A	PENNINCKX IRIS A M A ET AL: "Concomitant activation of jasmonate and ethylene response pathways is required for induction of a plant defensin gene in arabidopsis." PLANT CELL, vol. 10, no. 12, December 1998 (1998-12), pages 2103-2113, XP002146877 ISSN: 1040-4651 the whole document ---	23
A	THOMMA BART P H J ET AL: "Separate jasmonate-dependent and salicylate-dependent defense-response pathways in Arabidopsis are essential for resistance to distinct microbial pathogens." PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES, vol. 95, no. 25, December 1998 (1998-12), pages 15107-15111, XP002146878 Dec., 1998 ISSN: 0027-8424 the whole document ---	23
A	CORDERO MARIA JOSE ET AL: "Expression of a maize proteinase inhibitor gene is induced in response to wounding and fungal infection: Systemic wound-response of a monocot gene." PLANT JOURNAL, vol. 6, no. 2, 1994, pages 141-150, XP002146879 ISSN: 0960-7412 --- -/--	

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	GRAY J ET AL: "A NOVEL SUPPRESSOR OF CELL DEATH IN PLANTS ENCODED BY THE LLS 1 GENE OF MAIZE" CELL,US,CELL PRESS, CAMBRIDGE, NA, vol. 89, 4 April 1997 (1997-04-04), pages 25-31, XP002068010 ISSN: 0092-8674 -& DATABASE EMBL [Online] ACCESSION NO:U77346, 18 April 1997 (1997-04-18) GRAY, J. ET AL.: "Zea mays lethal leaf-spot 1 (lls1) gene, partial cds." XP002068011 -& DATABASE EMBL [Online] ACCESSION NO:U77345, 18 April 1997 (1997-04-18) GRAY, J. ET AL.: "Zea mays lethal leaf-spot 1 (lls1) mRNA, partial cds." XP002146987 abstract --- WO 98 39422 A (GRAY JOHN ;PIONEER HI BRED INT (US); UNIV MISSOURI (US); BRIGGS ST) 11 September 1998 (1998-09-11) -----	

INTERNATIONAL SEARCH REPORT

...tional application No.
PCT/US 00/11956

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-23 all partially

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-23 all partially

Polynucleotides from corn encoding COI1 polypeptides,and COI1 polypeptides as specified in SEQ ID NOS:1,2,and 15-18,chimeric genes, methods for selecting isolated polynucleotides, and obtaining nucleic acid fragments encoding disease resistance factors, compositions and methods for positive selection based on said sequences.

2. Claims: 1-23 all partially

Polynucleotides from rice encoding COI1 polypeptides,and COI1 polypeptides as specified in SEQ ID NOS:3,4,19 and 20,chimeric genes,methods for selecting isolated polynucleotides, and obtaining nucleic acid fragments encoding disease resistance factors, compositions and methods for positive selection based on said sequences.

3. Claims: 1-23 all partially

Polynucleotides from soybean encoding COI1 polypeptides,and COI1 polypeptides as specified in SEQ ID NOS:5,6,21 and 22,chimeric genes, methods for selecting isolated polynucleotides, and obtaining nucleic acid fragments encoding disease resistance factors, compositions and methods for positive selection based on said sequences.

4. Claims: 1-23 all partially

Polynucleotides from wheat encoding COI1 polypeptides,and COI1 polypeptides as specified in SEQ ID NOS:7,8,and 23-28,chimeric genes, methods for selecting isolated polynucleotides, and obtaining nucleic acid fragments encoding disease resistance factors, compositions and methods for positive selection based on said sequences.

5. Claims: 1-24 all partially

Polynucleotides from rice encoding Lls1 polypeptides,and Lls1 polypeptides as specified in SEQ ID NOS: 9,10,29 and 30,chimeric genes, methods for selecting isolated polynucleotides, and obtaining nucleic acid fragments encoding disease resistance factors, compositions and methods for positive selection, and method for evaluating the ability of a compound to inhibit Lls1, based on said sequences.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

6. Claims: 1-24 all partially

Polynucleotides from soybean encoding Llsl polypeptides,and Llsl polypeptides as specified in SEQ ID NOS:11,12,31 and 32,chimeric genes, methods for selecting isolated polynucleotides, and obtaining nucleic acid fragments encoding disease resistance factors, compositions and methods for positive selection, and method for evaluating the ability of a compound to inhibit Llsl, based on said sequences.

7. Claims: 1-24 all partially

Polynucleotides from wheat encoding Llsl polypeptides,and Llsl polypeptides as specified in SEQ ID NOS:13, 14,33-36,chimeric genes, methods for selecting isolated polynucleotides, and obtaining nucleic acid fragments encoding disease resistance factors, compositions and methods for positive selection, and method for evaluating the ability of a compound to inhibit Llsl, based on said sequences.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/US 00/11956

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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